

of determining whether points which are sensitive to touch are also sensitive to pain. His experiments make the answer doubtful, but he thinks they point toward a discreteness of the end apparatus of touch and pain. He found that the thresholds of both touch and pain were altered by softening the skin with warm water, soap and glycerin, the threshold for touch being raised, though not at all points, while the threshold for pain was lowered, *i. e.*, sensitiveness to touch was lessened while sensitiveness to pain was increased.

TEMPERATURE SENSE. His experiments confirmed Goldscheider's. Temperature spots were found to radiate from centres at which they are relatively numerous. The centres of the cold spots usually lie close to or coincide with the centres of the warm spots. The cold spots are on the whole more numerous; they reach more quickly and are more easily located. Both cold and warm spots seem to vary *inter se* in the strength of their reactions. Their sensitiveness differs at different times. By a slight pressure on the temperature spots (already located) warm and cold were experienced at the warm and cold spots respectively. Electrical stimulation had the same effect. In every temperature spot an analgesic point was found which would bear a heavy weight on a stimulating needle without producing pain.

INTENSITY OF SENSATIONS. This was found to vary considerably owing to the "subjective" factor.

JUDGMENT. It was shown that the greater the number of possibilities of judgment, the less the accuracy of the judgment. Every perception involved a combination with the stimulus of a concept prepared by past experience. Usually the number of concepts likely to be aroused by any stimulus is only limited by the context of events which the stimulus has entered; in the experiment we still lower this number, and in proportion as we lower it do we lower the threshold value of the stimulus.

He concludes, "Not only may a difference be noticeable or not, according to the way in which we define "noticeable," but, for any given criterion of noticeability, a difference may be noticeable or not, according to what we may mean by "difference." Mere difference may be noticeable at a point at which the specific kind of difference may be unnoticed. And, finally, with the same criterion of noticeability, a specific kind of difference may be noticeable or not, according to purely mental preparedness of the subject to receive it. With these facts recognized, the problem of psycho-physics awaits a re-statement."

CHRISTISON.

STUDIES IN THE PHYSIOLOGY AND PSYCHOLOGY OF THE TELEGRAPHIC LANGUAGE. By Prof. Wm. Lowe and Mr. Noble Harter, Indiana University, (Psychological Review, Jan., 1897).

Sixty operators were tested after Mr. Harter had spent eleven months in a preliminary investigation. The following are the principal facts developed: Highest sending record as far as known is 49 words per minute or $8\frac{1}{10}$ impacts per second. Subjective influences, as fear, anger, excitement, etc., have little effect on expert men other than to make them more fluent in the use of the telegraphic language. But in those not expert the emotions of fear, of anger and even of joy have the effect of paralyzing invention, so that only spasmodic or meaningless sound groups can be made, and every one recognizes that the man is rattled. Operators think in telegraphic terms. Those who work at night depend on their office call to waken them.

While an operator may detect an error or notice that a word was not appropriate in the connection used, and be able to suggest to the sender what the word should be, the language of the message as a

whole may have little or no meaning to him. There is a strong tendency to automatism with operators. Mr. S., a dispatcher, works daily with forty or fifty men, and states that after hearing four or five words he can readily recognize the sender or be sure that he is not one of his men. Many dispatchers claim that they can readily recognize a woman by her style of sending. The best time to learn telegraphy is eighteen years of age, and the maximum skill may be maintained until sixty-five years of age. Every operator shows personal peculiarities in his form of sending a message—by inflexions in experts, which increase in variations in proportion to expertness. At first the sending rate exceeds the receiving rate, but finally the receiving rate exceeds the sending rate as experience increases.

The operator hearing his own writing does not improve his power to receive in anything like the same degree that the hearing of other operator's writing does. Learners enjoy the practice of sending, but feel practice in receiving to be painful and fatiguing drudgery. As a rule, ordinary operators will not make the painful effort necessary to become experts. For many weeks there is an improvement which the student can feel sure of and which is proved by objective tests. Then follows a long period when the student can feel no improvement and when objective tests feel little or none. At the last end of this plateau, the messages on the main line are, according to the unanimous testimony of all who have experience in the matter, a senseless chatter to the student—practically as unintelligible as the same messages were months before. Suddenly, within a few days, the change comes, and the senseless chatter becomes intelligible speech. CHRISTISON.

THE MENTAL DEVELOPMENT OF A CHILD. By Cathleen Carter Moore (Psychological Review, Oct., 1896).

Mrs. Moore narrates and discusses the development of her child (a boy), during the first two years of its life, in a manner both precise and intelligent, and occupies 150 pages of a special issue of the Review with her subject. Nothing of the heredity or physical form of the child are mentioned. The following are the most noteworthy points given by her as she classified them. The observations of the first four were made by her husband.

Habits.—Within one hour from birth it sucked its thumb. It did the same at the end of its second year. After the first day it sucked its hands also, especially after long intervals, up to the eleventh week, after which it more or less sucked its thumb. Spontaneous movements often jerked its hand from its mouth up to the eleventh week when the jerks ceased. His aim for his mouth was very uncertain up to the eleventh week.

Hands and Arms.—During the first five days fingers were flexed in fists, and he slapped objects presented. Sixth day, fingers became frequently extended, but held near face. Twenty-ninth day, he would try to carry a presented finger to his mouth. Thirty-sixth day, he would grasp and hold clothing and carry a hand towards his face. Fifty-fifth day, he grasped at everything he came in contact with. Tenth week, he fingered things a great deal. Twelfth week, in his first attempt at reaching he fixed his gaze on the object, pursed his lips in attention and moved his hand graspingly towards it. Fifteenth week, hand uncertain and shaking in reaching. Seventeenth week, played with his own finger; did not try to get things beyond his reach, except by moving his body towards them. Twenty-first week, his feet became a favored plaything, and by the twenty-fifth week he objected to having them recovered. Twenty-sixth week, feet began to supplement the hands in feeling at objects. Twenty-seventh week, attempted to hold